

CLAIMS

We Claim:

1. An apparatus comprising:
  - 2 a polymer-based material; and
  - 3 a plurality of magnetically aligned magnetic material particles in said polymer-based material that form an electrically conductive path through a part of said polymer-based material.
- 1 2. The apparatus of claim 1 wherein said polymer-based material is selected from a group consisting of conductive polymers, thermoplastic polymers, and thermoset polymers.
- 1 3. The apparatus of claim 1 wherein said polymer-based material is a polyamide.
- 1 4. The apparatus of claim 1 wherein said polymer-based material is an ultra-violet light curable epoxy.
- 1 5. The apparatus of claim 1 wherein said magnetic material is selected from a group consisting of ferro-magnetic metal, a magnetic ceramic, and a ferro-electric material.
- 1 6. The apparatus of claim 1 wherein said apparatus is comprised of approximately 40 percent by weight polymer-based material and approximately 60 percent by weight magnetic material particles.

1      7.     The apparatus of claim 1 wherein said magnetic material particles are acicular  
2     shaped.

1      8.     The apparatus of claim 1 wherein said polymer-based material is a photo-resist  
2     material.

1      9.     The apparatus of claim 1 wherein said magnetic material particles are to form  
2     part of the electrically conductive path from a component to an underlying substrate.

1      10.    The apparatus of claim 1 wherein dimensions of the magnetic material particles  
2     are approximately one micron by two microns by ten microns.

1      11.    The apparatus of claim 1 wherein said magnetic material is selected from a  
2     group consisting of iron, barium strontium titanate, strontium tantalum oxide, and  
3     peroskovites.

1      12.    A method comprising:  
2               mixing a composition of magnetic material particles and a polymer-based  
3     material;  
4               depositing said composition onto a first component;  
5               placing a second component onto said first component at a site of the deposited  
6     composition;  
7               applying a magnetic field to said composition, to form an aligned path of said  
8     magnetic material particles and to bend said aligned path of magnetic material particles

9 to form part of a conductive path between said first component and said second  
10 component; and  
11 solidifying said polymer-based material.

1 13. The method of claim 12 further comprising putting said composition through a  
2 screen before said depositing.

1 14. The method of claim 13 wherein said putting includes using a squeegee.

1 15. The method of claim 12 further comprising pre-coating said first component  
2 before said depositing.

1 16. The method of claim 15 wherein said pre-coating comprises applying a thin  
2 layer of said composition.

1 17. The method of claim 12 further comprising testing the conductive path between  
2 said first component and said second component.

1 18. The method of claim 12 wherein said solidifying includes applying an ultra-  
2 violet light to said composition.

1 19. The method of claim 12 wherein solidifying includes changing said polymer-  
2 based material's temperature.

1 20. The method of claim 12 wherein said polymer-based material is solidified and  
2 said magnetic field is applied at approximately a same time.

1    21.    The method of claim 12 wherein applying a magnetic field includes using the  
2    magnetic field from a metallic surface to bend the aligned path.

1    22.    The method of claim 12 wherein mixing includes mixing the composition of  
2    magnetic material particles having dimensions of approximately one micron by two  
3    microns by ten microns.

1    23.    A system comprising:  
2         a substrate;  
3         a component coupled to said substrate; and  
4         a composition of magnetic material particles and a polymer-based material  
5         coupled to said component and said substrate

1    24.    The system of claim 23 further comprising screen pads coupled to said  
2    substrate.

1    25.    The system of claim 23 wherein said magnetic material particles include a  
2    conductive path between said component and said substrate.

1    26.    The system of claim 23 wherein said substrate is selected from a group  
2    consisting of printable circuit boards, aluminum lead frames, and fine pitch ball grid  
3    arrays.

1    27. The system of claim 23 wherein said composition is comprised of  
2    approximately 40 percent by weight of the polymer-based material and approximately  
3    60 percent by weight of the magnetic material particles.

1    28. The system of claim 23 wherein said magnetic material particles are acicular  
2    shaped.

1    29. The system of claim 23 wherein said polymer-based material is a photo-resist  
2    material.

1    30. The system of claim 23 wherein a coefficient of thermal expansion of the  
2    polymer-based material is approximately equal to a coefficient of thermal expansion of  
3    the substrate.